

Claims

What is claimed is:

1. An ultrasonic vibration tool comprising:

a block of substantially rectangular parallelepiped form,  
5 the block including an end face formed as an output end face,  
and another end face opposite the output end face formed as an  
input end face; and

an ultrasonic vibration source connected to the input end  
face,

wherein a mass distribution is provided in a vicinity of  
the input end face to ensure a uniform amplitude distribution  
in the output end face.

2. The ultrasonic vibration tool according to claim 1,  
wherein

15 at a longitudinal side face of the block, peripheries of  
the output and input end faces each constitute a mass portion,  
and slits are formed between the mass portions at a pitch which  
is less than a half of an oscillation wavelength to obtain a  
plurality of elastic portions, and

20 the mass portion on a side of the input end face includes  
a protrusion having a height equal to or less than a quarter of  
the oscillation wavelength.

3. The ultrasonic vibration tool according to claim 2,

wherein

25 the protrusion is formed integrally with the block so as

to correspond to each of the elastic portions.

4. The ultrasonic vibration tool according to claim 2,  
wherein

the protrusion is formed by fixing a separate protrusion  
5 forming member to the block so as to correspond to each of the  
elastic portions.

5. The ultrasonic vibration tool according to claim 1,  
wherein

at a longitudinal side face of the block, peripheries of  
10 the output and input end faces each constitute a mass portion,  
and slits are formed between the mass portions at a pitch which  
is less than a half of an oscillation wavelength to obtain a  
plurality of elastic portions, and

the mass portion on a side of the input end face includes  
15 a recess.

6. The ultrasonic vibration tool according to claim 5,  
wherein

the recess is so formed as to correspond to each of the  
elastic portions.

20 7. The ultrasonic vibration tool according to claim 1,  
wherein the ultrasonic vibration source is connected to a  
central portion of the input end face, and  
a protrusion whose height increases with distance from  
the central portion is formed in the input end face.

25 8. The ultrasonic vibration tool according to claim 1,

wherein the ultrasonic vibration source is connected to a central portion of the input end face, and  
a recess whose depth decreases with distance from the central portion is formed in the input end face.

5        9. An ultrasonic vibration tool comprising:  
            a block of substantially rectangular parallelepiped form,  
the block including an end face formed as an output end face,  
and another end face opposite the output end face formed as an  
input end face; and  
10        an ultrasonic vibration source connected to the input end  
face,  
            wherein peripheries of the output and input end faces  
each constitute a mass portion, and slits are formed between  
the mass portions at a pitch which is equal to or less than a  
15        quarter of an oscillation wavelength to obtain a plurality of  
elastic portions, and  
            the elastic portions have mutually different elastic  
coefficients so as to ensure a uniform amplitude distribution  
in the output end face.

20        10. The ultrasonic vibration tool according to claim 9,  
wherein

            the elastic coefficients of the elastic portions are  
varied by varying cross-sectional areas thereof.

25        11. The ultrasonic vibration tool according to claim 9,  
wherein

the ultrasonic vibration source is connected to a central portion of the input end face, and the elastic coefficients of the elastic portions decrease with distance from the central portion.

5        12. A fixing device comprising:

the ultrasonic vibration tool as set forth in claim 1 or  
9; and

a supporting member disposed opposite the output end face of the ultrasonic vibration tool,

10        wherein a fixation sheet is supplied between the output end face of the ultrasonic vibration tool and the supporting member.

15        13. The fixing device according to claim 12, further comprising an intermediate belt which is movable along the output end face of the ultrasonic vibration tool, wherein a fixation sheet is supplied between the supporting member and the intermediate belt.

20        14. A fixing device comprising:

the ultrasonic vibration tool as set forth in claim 1 or  
20 9;

a heat-transfer rotary body disposed opposite the output end face of the ultrasonic vibration tool, the heat-transfer rotary body having a heat generating and transferring layer formed in an outer peripheral portion thereof; and

25        a supporting member disposed opposite the heat-transfer

rotary body,

wherein a fixation sheet is supplied between the heat-transfer rotary body and the supporting member.

15. The fixing device according to claim 14, wherein  
5 the heat-transfer rotary body is composed of a fixing roller which has a rubber layer formed in an outer peripheral portion thereof.

16. The fixing device according to claim 14, wherein  
the heat-transfer rotary body is composed of a fixing  
10 belt which has a rubber layer formed in an outer peripheral portion thereof, the fixing belt being entrained about a supporting roller and a pressure-applying roller, the supporting roller being arranged opposite the output end face of the ultrasonic vibration tool, the pressure-applying roller  
15 being arranged opposite the supporting member.

17. A heating device comprising:

the ultrasonic vibration tool as set forth in claim 1 or  
9; and

a supporting member disposed opposite the output end face  
20 of the ultrasonic vibration tool,

wherein a sheet being heated is supplied and discharged between the output end face of the ultrasonic vibration tool and the supporting member.